1 / Solve the IVP

\[ x^2 y'' + 1.1 x y' + y = 0, \quad y(1) = 2, \quad y'(1) = 0, \]

and plot the solution in the interval \([1, 20]\).

2 / Using the 'laplace' command solve the IVP

\[ y'' + 2y' + 2y = \sin t + \sin(t-Pi)u(t-Pi), \quad y(0) = 2, \quad y'(0) = 0, \]

where \(u\) is the unit step function, and plot the solution in \([0, 25]\).

3 / Consider the matrix \( A = \begin{pmatrix} -2 & -0.5 \\ 6.5 & 1 \end{pmatrix} \)

   a) Find the eigenvalues and eigenvectors of \( A \)
   b) Solve the IVP \( X' = AX, \quad X(0) = \begin{pmatrix} 0 \\ 2 \end{pmatrix} \)
   c) Plot the solution in the interval \([0, 9]\)

4 / Consider the matrix \( A = \begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & 3 \\ 3 & 3 & 1 \end{pmatrix} \)

   a) Find the eigenvalues and eigenvectors of \( A \)
   b) Solve the system \( X' = AX, \quad X(0) = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} \)